

Other Topics: Present/Future Values, Predicting Costs, and Allowance for Uncollectible Accounts

In this chapter you will learn:

- How to use Excel to prepare a present/future value analysis
- How to use Excel to predict costs
- How to use Excel to calculate an allowance for uncollectible accounts

Case: What SUP, Inc.

Nathan and Megan are aware that there are other accounting issues that may be aided by using Excel. Kyle explains that this week they will look at how Excel can help them calculate present and future values based on assumptions about interest rates, time, and financial needs. They will also look at predicting future costs based on trends experienced in the current year. They will utilize Excel's ability to visualize cost behaviors: fixed and variable costs based on past experience and Excel's charting ability to examine patterns of cost behavior. Lastly they will look at using Excel to calculate uncollectible accounts expense and an allowance for uncollectible accounts using both the percentage of sales and aging methods.

As the recent accounting graduate in the group, you offer to lend your accounting expertise to using Excel to solve these common business problems.

Present/Future Value Analysis

The first additional accounting issue Nathan and Megan agree to tackle is the calculation of present and future values. Kyle suggests that they consider using Excel to help them calculate how much they should invest now to be able to meet an expected future equipment purchase need. In this case Excel will calculate the present value of a lump sum payment in the future. Alternatively, they could put some funds away at the end of each year to save up for the equipment purchase. Kyle explains that that approach requires that they calculate an annuity payment they would make into a fund so that at the end of a certain period they would have funds for the purchase.

"This is perfect," says Megan. "We anticipate having to replace equipment we currently use with more modern and efficient equipment in 5 years. We expect it will cost about \$50,000 at that time."

"Excellent," says Kyle. "We'll approach this problem from both angles: calculating a lump sum to be invested now and calculating an annuity to help save for this future purchase."

You explain that all present value problems have five variables: (1) interest rate, (2) term, (3) annuity payment, (4) future value, and (5) present value. If you know four of the variables, you can always calculate the fifth. Interest rates are currently 6 percent, and Megan indicated the term of 5 years and future cost of \$50,000. Under scenario 1, the company wants to know what amount should be invested now to have \$50,000 in 5 years assuming a 6 percent return on their investment.

The present value function in Excel is written $PV(\text{rate}, \text{nper}, \text{pmt}, \text{fv}, \text{type})$. PV stands for present value. The arguments to that function are contained within the parentheses. The rate is the periodic interest rate, nper is the number of periods, pmt is the periodic annuity payment, fv is the lump sum future value, and type represents ordinary annuity or annuity due which basically indicates whether payments are made at the beginning or ending of the period in question. We will assume all payments are made at the end of the period. For this problem the $\text{fv} = \$50,000$, $\text{rate} = 6\%$, and the $\text{nper} = 5$ years.

To calculate a present value of a lump sum:

- 1 Open Excel.
- 2 Enter the information with correct formats, as shown in Figure 7.1.

	A	B	C
1	What SUP		
2	Present Value Analysis		
3			
4	Lump Sums		
5			
6	Future need:	\$50,000.00	
7	Interest rate:	6%	
8	Term (in years):	5	
9			

Figure 7.1

Creating a Lump Sums Worksheet

- 3 In cell A10 type **Invest now:**
- 4 In cell B10 type the formula $=PV(B7,B8,0,B6)$. B7 is the first argument to the PV function since it is where we have stored the rate. B8 is the second argument since it is where we have stored the number of periods, 0 is the third argument since this problem doesn't require an annuity payment, and B6 is the fourth argument since that is where we have stored the future value. Now press **[Enter]**.
- 5 Your screen should look like Figure 7.2 Keep it open.

Figure 7.2

Adding an Invest Now Formula

	A	B	C
1	What SUP		
2	Present Value Analysis		
3			
4	Lump Sums		
5			
6	Future need:	\$50,000.00	
7	Interest rate:	6%	
8	Term (in years):	5	
9			
10	Invest now:	(\$37,362.91)	

“Why is the amount negative?” Nathan asks.

“Well,” you explain, “that is the amount we have to give up now to have \$50,000 in 5 years if we can earn 6 percent per year.”

“You’ll have to prove that to me,” Nathan retorts.

“Ok,” you answer. “I’ll create a column for the year, interest earned, and investment value. I always start with year 0 since that represents the end of last year and the beginning of this year. In the interest column I’ll be entering the interest earned each year at 6 percent of the investment balance held during the year. In the final column I’ll be entering the end of year balance in the investment, which will be the previous year’s balance plus interest earned during the current year.

To prove the increase in value over the 5 years:

- 1 Create a table in Excel like the one shown in Figure 7.3.

Figure 7.3

Creating a Proof of Lump Sums Calculations

	A	B	C	D	E	F
1	What SUP					
2	Present Value Analysis					
3						
4	Lump Sums					
5				Year	Interest	Investment
6	Future need:	\$50,000.00		0		
7	Interest rate:	6%		1		
8	Term (in years):	5		2		
9				3		
10	Invest now:	(\$37,362.91)		4		
11				5		

- 2 Type `=-B10` in cell F6 since that is the beginning of the year investment. (Be sure to include the minus sign in front of the cell reference so that values all come out positive).

- 3 Type $=F6*\$B\7 in cell E7. This will calculate the interest earned each year by multiplying the rate (always located in cell B7) times the beginning of year investment.
- 4 Fill the formula written in cell E7 down to cell E11.
- 5 Type $=E7+F6$ in cell F7. This will calculate the end of the year balance in the investment account.
- 6 Fill the formula written in cell F7 down to cell F11.
- 7 Your screen should look like Figure 7.4.

	A	B	C	D	E	F
1	What SUP					
2	Present Value Analysis					
3						
4	Lump Sums					
5				Year	Interest	Investment
6	Future need:	\$50,000.00		0		\$37,362.91
7	Interest rate:	6%		1	\$2,241.77	\$39,604.68
8	Term (in years):	5		2	\$2,376.28	\$41,980.96
9				3	\$2,518.86	\$44,499.82
10	Invest now:	(\$37,362.91)		4	\$2,669.99	\$47,169.81
11				5	\$2,830.19	\$50,000.00

Figure 7.4

Completed Proof of Lump Sum Calculations

- 8 Press [Ctrl] and [~] at the same time to switch to formula view. Your screen should look like Figure 7.5.

	A	B	C	D	E	F
1	What SUP					
2	Present Value Analysis					
3						
4	Lump Sums					
5				Year	Interest	Investment
6	Future need:	50000		0		=-B10
7	Interest rate:	0.06		1	=F6*\$B\$7	=E7+F6
8	Term (in years):	5		2	=F7*\$B\$7	=E8+F7
9				3	=F8*\$B\$7	=E9+F8
10	Invest now:	=PV(B7,B8,0,B6)		4	=F9*\$B\$7	=E10+F9
11				5	=F10*\$B\$7	=E11+F10

Figure 7.5

Formula View of Completed Proof of Lump Sum Calculations

- 9 Press [Ctrl] and [~] at the same time to switch back to value view.
- 10 Save your file with the name Ch7PV.

After calculating a lump sum to be invested now to achieve a future need, you now turn your attention to calculating an annuity to help save for this future purchase. An annuity is a constant payment either received or paid over a specific period of time. Excel helps you solve this with the payment function (PMT).

The PMT function in Excel is written $PMT(\text{rate}, \text{nper}, \text{pv}, [\text{fv}], [\text{type}])$. The arguments to that function are contained within the parentheses. The rate is the periodic interest rate, nper is number of payments, pv is the lump sum present

value, *fv* is the lump sum future value, and *type* represents ordinary annuity or annuity due which basically indicates whether payments are made at the beginning or ending of the period in question. We will assume all payments are made at the end of the period. For this problem the *pv* is 0, *fv* = \$50,000, *rate* = 6%, and the *nper* = 5 years.

To calculate the annuity payment required to meet a future need:

- 1 Start a new worksheet (don't close the current file) and then enter the information as shown in Figure 7.6.

Figure 7.6

Creating an Annuities Worksheet

	A	B	C
1	What SUP		
2	Present Value Analysis		
3			
4	Annuities		
5			
6	Future need:	\$50,000.00	
7	Interest rate:	6%	
8	Term (in years):	5	
9			
10	Annuity payment:		

- 2 Type `=PMT(B7,B8,0,B6)` into cell B10, being sure to type zero (0) in the third argument to indicate no present value payment is made in this analysis.

- 3 Press [Enter]. Your resulting worksheet should look like Figure 7.7.

Figure 7.7

Calculated Annuity

	A	B	C
1	What SUP		
2	Present Value Analysis		
3			
4	Annuities		
5			
6	Future need:	\$50,000.00	
7	Interest rate:	6%	
8	Term (in years):	5	
9			
10	Annuity payment:	(\$8,869.82)	

- 4 To prove that an annual payment of \$8,869.82 earning interest at 6 percent per year will yield the \$50,000 future value, set up the table below on your worksheet, as shown in Figure 7.8.

	A	B	C	D	E	F	G
1	What SUP						
2	Present Value Analysis						
3							
4	Annuities						
5				Year	Interest	Annuity	Investment
6	Future need:	\$50,000.00		0			
7	Interest rate:	6%		1			
8	Term (in years):	5		2			
9				3			
10	Annuity payment:	(\$8,869.82)		4			
11				5			

Figure 7.8
Annuity Table

- 5 Type 0 in cell G6 since there is no beginning investment amount.
- 6 Type $=G6*BS7$ in cell E7 which multiplies the interest rate times the end of year investment amount. Format the cell using the Currency format.
- 7 Fill the formula just created in E7 down through cell E11.
- 8 Type $=-BS10$ in cell F7 to place the annuity payment in this cell. (Putting the minus sign in front is done to reflect a positive value).
- 9 Fill the formula just created in F7 down through cell F11.
- 10 Type $=G6+E7+F7$ in cell G7 to sum the previous year's investment with the current year's interest and annuity payment.
- 11 Fill the formula just created in G7 down through cell G11. Your worksheet should look like Figure 7.9.

	A	B	C	D	E	F	G
1	What SUP						
2	Present Value Analysis						
3							
4	Annuities						
5				Year	Interest	Annuity	Investment
6	Future need:	\$50,000.00		0			0
7	Interest rate:	6%		1	\$ -	\$8,869.82	\$8,869.82
8	Term (in years):	5		2	\$ 532.19	\$8,869.82	\$18,271.83
9				3	\$ 1,096.31	\$8,869.82	\$28,237.96
10	Annuity payment	(\$8,869.82)		4	\$ 1,694.28	\$8,869.82	\$38,802.06
11				5	\$ 2,328.12	\$8,869.82	\$50,000.00

Figure 7.9
Completed Annuity Table

- 12 Save your file with the name Ch7PVAN.

“Now,” you explain, “you know that you can either invest \$37,362.91 today or you can invest \$8,869.82 annually to achieve your \$50,000 in 5 years at 6 percent.

“What if I can only earn a 5 percent return?” Nathan asks.

“I’ll show you.” you answer. “This requires a what-if analysis. All you have to do is change the interest rate from 6 percent to 5 percent.”

Nathan decides to try this himself by typing 5% in cell B7 of the Ch7PVAN and Ch7PV worksheet files. His resulting worksheet looks like Figures 7.10 and 7.11 below.

Figure 7.10
Required Investment at 5%

	A	B	C	D	E	F
1	What SUP					
2	Present Value Analysis					
3						
4	Lump Sums					
5				Year	Interest	Investment
6	Future need:	\$50,000.00		0		\$39,176.31
7	Interest rate:	5%		1	\$1,958.82	\$41,135.12
8	Term (in years):	5		2	\$2,056.76	\$43,191.88
9				3	\$2,159.59	\$45,351.47
10	Invest now:	(\$39,176.31)		4	\$2,267.57	\$47,619.05
11				5	\$2,380.95	\$50,000.00

Figure 7.11
Required Annuity at 5%

	A	B	C	D	E	F	G
1	What SUP						
2	Present Value Analysis						
3							
4	Annuities						
5				Year	Interest	Annuity	Investment
6	Future need:	\$50,000.00		0			0
7	Interest rate:	5%		1	\$ -	\$9,048.74	\$9,048.74
8	Term (in years):	5		2	\$ 452.44	\$9,048.74	\$18,549.92
9				3	\$ 927.50	\$9,048.74	\$28,526.15
10	Annuity payment	(\$9,048.74)		4	\$ 1,426.31	\$9,048.74	\$39,001.20
11				5	\$ 1,950.06	\$9,048.74	\$50,000.00

“That makes sense,” Nathan comments. “If I can only earn 5 percent I need to invest more now, \$39,176.31 versus \$37,262.91 assuming a 6 percent return. Alternatively, I would have to make a larger annuity payment of \$9,048.74 assuming a 5 percent return versus \$8,869.82 assuming a 6 percent return.”

“What about working the other way around?” Meagan asks. “I would like to know how much I would have in 5 years if I was able to invest either \$10,000 right now or \$1,000 per year assuming a 5 percent return on my investment.”

You explain that that requires the use of another of Excel’s built-in functions. The FV function takes very similar arguments to the PV function you just described. It is written FV(rate,per,pmt,pv,type) where pv and type are optional.

“Let’s create a new worksheet for future values,” you suggest.

To create a future value worksheet and table:

- 1 Enter the information with correct formats as shown in Figure 7.12.

Figure 7.12
Beginning Your Future Value Worksheet

	A	B	C	D	E	F
1	What SUP					
2	Future Value Analysis					
3						
4	Lump Sums					
5				Year	Interest	Investment
6	Current investment:	\$(10,000.00)		0		
7	Interest rate:	5%		1		
8	Term (in years):	5		2		
9				3		
10	Investment value in future:			4		
11				5		

- 2 Type the formula **=FV(B7,B8,0,B6)** into cell B10. This sets the rate at 5%, which is in cell B7; the period to 5, which is in cell B8; the annuity payment to zero since this part of the problem has no annuity payment; and the present value to the current investment shown in cell B6.
- 3 Press [**Enter**].
- 4 Type **=-B6** into cell F15
- 5 Type **=F6*\$B\$7** into cell E16 and then fill the formula down to cell E11. This cell calculates the interest earned on the investment balance at the end of the previous year.
- 6 Type **=E7+F6** into cell F16 to add the current year interest and prior year investment amounts together and then fill the formula down to cell F11. Your resulting worksheet should look like Figure 7.13. Save your file with the name Ch7FV.

	Year	Interest	Investment
Current Investment:	0		\$10,000.00
Interest rate:	1	\$ 500.00	\$10,500.00
Term (in years):	2	\$ 525.00	\$11,025.00
	3	\$ 551.25	\$11,576.25
Investment value in future:	4	\$ 578.81	\$12,155.06
	5	\$ 607.75	\$12,762.82

Figure 7.13

Future Value of a Lump Sum

- 7 Enter the information with correct formats as shown in Figure 7.14.

	Year	Interest	Annuity	Investment
Current annuity investment:	0			
Interest rate:	1			
Term (in years):	2			
	3			
Investment value in future:	4			
	5			

Figure 7.14

Continuing Your Future Value Worksheet

- 8 Type the formula **=FV(B7,B8,B6)** into cell B10. This sets the rate at 5%, which is in cell B7; the period to 5, which is in cell B8; and the annuity payment to \$1,000, which is in cell B6.
- 9 Press [**Enter**].
- 10 Type **0** into cell G6.
- 11 Type **=G6*\$B\$7** into cell E7 and then fill the formula down to cell E11. This cell calculates the interest earned on the investment balance at the end of the previous year.
- 12 Type **=-B\$6** into cell F7 and then fill the formula down to F11. This places the annual payment into the cell.

13 Type **=G6+E7+F7** into cell G7 to add the current year interest, current year annuity payment, and prior year investment amounts together and then fill the formula down to cell G11. Your resulting worksheet should look like Figure 7.15. Save your file with the name Ch7FVAN.

Figure 7.15
Future Value of an Annuity

	A	B	C	D	E	F	G
1	What SUP						
2	Future Value Analysis						
3							
4	Annuities						
5				Year	Interest	Annuity	Investment
6	Current annuity investment:	\$ (1,000.00)		0			0
7	Interest rate:	5%		1	\$ -	\$ 1,000.00	\$1,000.00
8	Term (in years):	5		2	\$ 50.00	\$ 1,000.00	\$2,050.00
9				3	\$ 102.50	\$ 1,000.00	\$3,152.50
10	Investment value in future:	\$5,525.63		4	\$ 157.63	\$ 1,000.00	\$4,310.13
11				5	\$ 215.51	\$ 1,000.00	\$5,525.63

Meagan and Nathan are both very pleased with their worksheet creation, which tells them the future value of a lump sum investment and the future value of an annual annuity.

“Can we change the interest rates to see the effect of earning either a higher or lower rate?” Meagan asks.

“Sure,” you respond.

You change the Interest rates to 7 percent for both the annuity and lump sum to get the results, as shown in Figure 7.16 and 7.17.

Figure 7.16
Future Value of an Initial Investment of \$10,000 at 7% for 5 years

	A	B	C	D	E	F
1	What SUP					
2	Future Value Analysis					
3						
4	Lump Sums					
5				Year	Interest	Investment
6	Current Investment:	\$ (10,000.00)		0		\$10,000.00
7	Interest rate:	7%		1	\$ 700.00	\$10,700.00
8	Term (in years):	5		2	\$ 749.00	\$11,449.00
9				3	\$ 801.43	\$12,250.43
10	Investment value in future:	\$14,025.52		4	\$ 857.53	\$13,107.96
11				5	\$ 917.56	\$14,025.52

Figure 7.17
Future Value of an Annual Annuity Investment of \$1,000 at 7% for 5 years

	A	B	C	D	E	F	G
1	What SUP						
2	Future Value Analysis						
3							
4	Annuities						
5				Year	Interest	Annuity	Investment
6	Current annuity investment:	\$ (1,000.00)		0			0
7	Interest rate:	7%		1	\$ -	\$ 1,000.00	\$1,000.00
8	Term (in years):	5		2	\$ 70.00	\$ 1,000.00	\$2,070.00
9				3	\$ 144.90	\$ 1,000.00	\$3,214.90
10	Investment value in future:	\$5,750.74		4	\$ 225.04	\$ 1,000.00	\$4,439.94
11				5	\$ 310.80	\$ 1,000.00	\$5,750.74

Predicting Future Costs

Another issue facing What SUP is predicting future costs. They know that, based on past experiences, certain expenses tend to be constant over time while others vary from month to month. Megan explains that her monthly operating expenses seem to vary according to how many days the store is open, and she asks you whether Excel can help predict costs based on this previous cost behavior.

You explain that accountants use two basic methods to predict costs: the Hi-Lo method and the Least Squares/ Regression method.

“The Hi-Lo method is the easiest but least accurate, while the Least Squares/ Regression method is a bit more complicated but much more accurate,” you comment. “Excel can do both and we can create a chart to graphically represent the pattern of cost behavior.”

You start by gathering data on past experiences. Nathan provides you with the following information showing monthly expenses and days open by month, as shown in Figure 7.18.

Month	Days Open	Expense
Jan	20	4,500
Feb	18	4,200
Mar	21	4,600
Apr	16	3,800
May	22	4,800
Jun	23	5,000
Jul	25	6,000
Aug	26	6,100
Sep	22	5,000
Oct	18	4,300
Nov	17	4,100
Dec	16	4,000

Figure 7.18

Expenses and Days Open by Month

You decide to enter this information into Excel and then perform a Hi-Lo method analysis. To do so, you first need to enter the data into a new worksheet, calculate the high and low expense and days open, calculate the difference, and then determine the variable and fixed cost behaviors.

“The difference in cost between months must be attributed to a change in variable cost since each month should continue to have the same fixed cost,” you explain. “That is the basis of the Hi-Lo method. We’ll use the Min and Max functions built-in to Excel to help calculate the high and low costs and days open and then calculate the variable and fixed costs. The variable cost can be calculated by dividing the difference in the high and low costs by the difference in the high and low days open. The fixed costs can be calculated by subtracting variable costs from total costs. After that we’ll be able to predict costs in a future month based on the number of days open.”

To create a Hi-Lo method analysis:

- 1 Open Excel and start a new worksheet.
- 2 Enter the information with correct formats, as shown in Figure 7.19.

Figure 7.19
Expenses Entered into Excel

	A	B	C	D	E
1	What SUP				
2	Predicting Costs				
3					
4			Month	Days Open	Expense
5			Jan	20	4,500
6			Feb	18	4,200
7			Mar	21	4,600
8			Apr	16	3,800
9			May	22	4,800
10			Jun	23	5,000
11			Jul	25	6,000
12			Aug	26	6,100
13			Sep	22	5,000
14			Oct	18	4,300
15			Nov	17	4,100
16			Dec	16	4,000

- 3 Type **High Expense** in cell A18 as a label.
- 4 Type **Low Expense** in cell A19 as a label.
- 5 Type **Difference** in cell A20 as a label.
- 6 Type **Hi-Lo Method** in cell A22 as a label.
- 7 Type **Variable cost/day open** in cell A23 as a label.
- 8 Type **Fixed cost** in cell A24 as a label.
- 9 Type $=\text{MAX}(\text{D5:D16})$ in cell D18 to calculate the highest number of days open.
- 10 Type $=\text{MAX}(\text{E5:E16})$ in cell E18 to calculate the highest amount of expense.
- 11 Type $=\text{MIN}(\text{D5:D16})$ in cell D19 to calculate the lowest number of days open.
- 12 Type $=\text{MIN}(\text{E5:E16})$ in cell E19 to calculate the lowest amount of expense.
- 13 Type $=\text{D18-D19}$ in cell D20 to calculate the difference between the highest and lowest days open.
- 14 Type $=\text{E18-E19}$ in cell E20 to calculate the difference between the highest and lowest expense.
- 15 Type $=\text{E20/D20}$ in cell C23 to calculate the variable cost per day open.

- 16** Type $=E18-(C23*D18)$ in cell C24 to calculate the fixed cost per month.
- 17** Type **Prediction of expense if open** in cell A26.
- 18** Type **20** in cell B26.
- 19** Type **days =** in cell C26.
- 20** Type $=(B26*C23)+C24$ in cell D26 to calculate the total costs assuming a fixed cost as calculated in cell C24, a variable cost as calculated in cell C23, and a number of days open as stated in cell B26.
- 21** Format your worksheet like the completed worksheet shown in Figure 7.20.
- 22** Save your work using file name Ch7HiLo.xlsx.

	A	B	C	D	E
1	What SUP				
2	Predicting Costs				
3					
4			Month	Days Open	Expense
5			Jan	20	4,500
6			Feb	18	4,200
7			Mar	21	4,600
8			Apr	16	3,800
9			May	22	4,800
10			Jun	23	5,000
11			Jul	25	6,000
12			Aug	26	6,100
13			Sep	22	5,000
14			Oct	18	4,300
15			Nov	17	4,100
16			Dec	16	4,000
17					
18	High Expense			26	6,100
19	Low Expense			16	3,800
20	Difference			10	2,300
21					
22	Hi-Lo Method				
23	Variable cost/day open		\$ 230.00		
24	Fixed cost		\$ 120.00		
25					
26	Prediction of expense if open	20 days =		\$ 4,720	

Figure 7.20

Hi-Lo Method Worksheet

Megan is delighted with your new worksheet. You explain that by varying the value of cell B26 you can calculate the expected costs for any future month based on the number of days she expects to be open.

“How can we graphically illustrate this pattern of cost behavior?” Meagan asks.

“Easy,” you retort, “let me show you.”

To create a chart of cost behavior:

- 1** Select the range of cells from D4 to E16.
- 2** Click the **Scatter** chart from Charts group on the Insert tab of the Ribbon, and then select **Scatter with only markers**.
- 3** Select the **Expense** legend and press the **[Delete]** key to remove it.
- 4** Double-click the horizontal axis of the chart and select **Axis Options**.
- 5** Set the minimum axis by selecting **Fixed** and typing **15.0** as the minimum.
- 6** Set the maximum axis by selecting **Fixed** and typing **27.0** as the maximum.
- 7** With the chart selected, click **Axis Titles** from the Labels group of the Layout tab of the Ribbon.
- 8** Select **Primary Horizontal Axis Title** and then select **Title Below Axis**.
- 9** Type **Days Open** as the horizontal axis title.
- 10** Double-click the vertical axis of the chart and select **Axis Options**.
- 11** Set the minimum axis by selecting **Fixed** and typing **3000** as the minimum.
- 12** Set the maximum axis by selecting **Fixed** and typing **6500** as the maximum.
- 13** With the chart selected click **Axis Titles** from the Labels group of the Layout tab of the Ribbon.
- 14** Select **Primary Vertical Axis Title** and then select **Vertical Title**.
- 15** Type **Expense** as the vertical axis title.
- 16** Select the chart title and change the name by typing **Expense/Days Open**.
- 17** On the Layout tab in the Analysis group, click **Trendline** and then select **Linear Trendline**. Your chart should look like Figure 7.21.

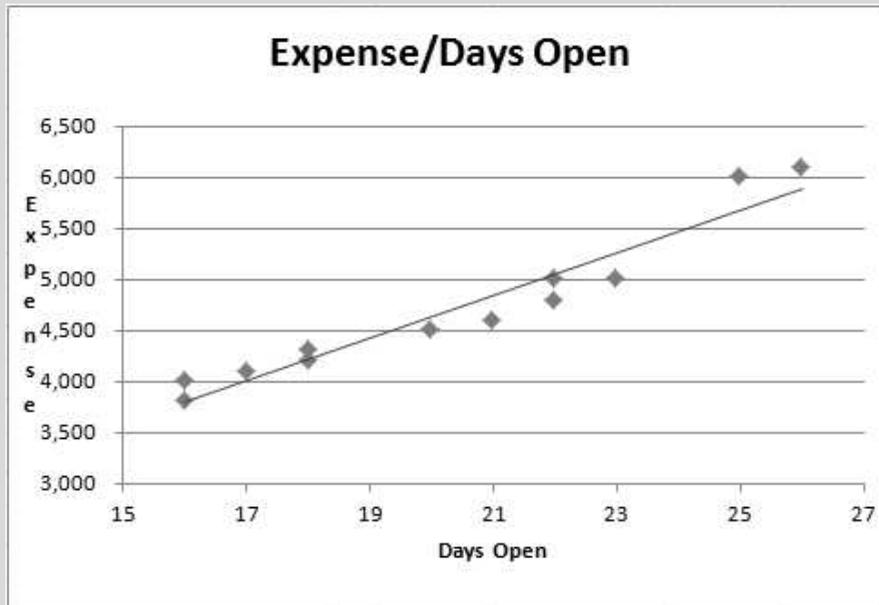


Figure 7.21

Chart of Expense/Days Open

18 Save your work.

You explain to Nathan and Megan that this trend line uses all 12 data points to predict costs, which is exactly what the Least Squares/Regression method does. The trick now is to determine the slope of that line (otherwise known as the variable cost per unit) and the vertical axis intercept (otherwise known as fixed costs).

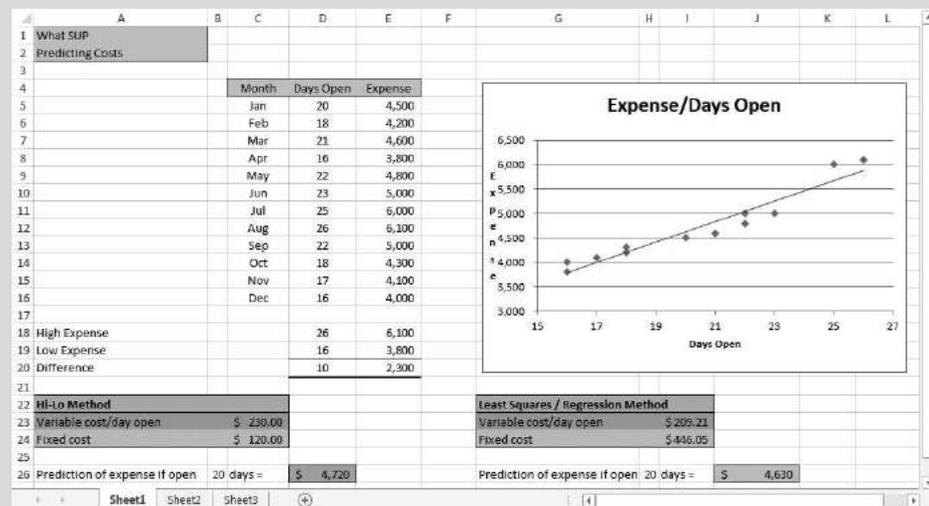
“The Slope and Intercept functions of Excel are used in the Least Squares/Regression method. The Slope function provides the slope of a line (in other words, variable costs per unit) defined by two arguments: known y’s and known x’s. In our case the known y’s are the actual costs and the known x’s are actual days open. Both are located on our worksheet in an array of cells located at E5 to E16 and D5 to D16 respectively. The Intercept function takes the same two arguments and provides the value of costs incurred when the days open are zero (in other words, fixed costs).”

To calculate the variable cost per day open and fixed costs using Excel:

- 1** Type **Least Squares/ Regression Method** as a label in cell G22.
- 2** Type **Variable cost/day** open as a label in cell G23.
- 3** Type **Fixed cost** as a label in cell G24.
- 4** Type **=SLOPE(E5:E16,D5:D16)** in cell I23 to calculate the variable cost per unit by using the data provided on the worksheet.

- 5 Type `=INTERCEPT(E5:E16,D5:D16)` in cell I24 to calculate the fixed costs by using the data provided on the worksheet.
- 6 Type **Prediction of expense if open** in cell G26 as a label.
- 7 Type **20** in cell H26.
- 8 Type **days =** in cell I27 as a label.
- 9 Type `=TREND(E5:E16,D5:D16,H26)` to calculate the predicted costs assuming 20 open days.
- 10 Format your worksheet like Figure 7.22. Save your work.

Figure 7.22
Completed Predicting
Costs Worksheet



Megan notes that the two methods predict different expense amounts for 20 open days. She speculates that the Least Squares/ Regression method is more accurate since it used 12 data points whereas the Hi-Lo method, used only two.

You agree and conclude that although the Least Squares/Regression method uses some functions like trend, slope, and intercept (which sound too mathematical to Megan) it does produce the more accurate predictions.

Calculating an Allowance for Uncollectible Accounts

An additional accounting issue that What SUP is confronting is the need for an allowance for uncollectible accounts. Two years ago Megan had recommended that the business extend credit to customers, which gave them 30 days to pay for their purchases. In doing so she realized the risk associated with granting credit and that some customers, for a variety of reasons, may end up not paying their bills. They have been collecting data on their experience with non-payment and know that, according to generally accepted accounting principles, they needed

to establish an allowance for uncollectible accounts and record some uncollectible accounts expense in the current accounting period.

“There are two common methods for estimating the expense and allowance,” you say. “You can either use the percent of sales method or an aging method. Excel can help us with the calculations since in both cases all we are doing is multiplying an estimated uncollectible accounts percentage times either sales or an aging of accounts receivable balances.”

Megan provides last year’s receivable and sales information. The beginning balance in receivables was \$500,000. During the year the company had sales of \$5,600,000 and collections of \$5,280,000. They wrote off \$20,000 in accounts receivable during the year. She created an estimate of the allowance at the end of last year of \$25,000.

To calculate the allowance using the percent of sales method:

- 1 Open Excel, click the **File** menu, and then click **New**.
- 2 Double-click **Blank Workbook**.
- 3 Enter the information with correct formats as shown in Figure 7.23.

	A	B	C	D	E	F	G	H
1	What SUP							
2	Allowance for Uncollectible Accounts							
3								
4	Percentage of Sales Method							
5								
6	Accounts receivable balance (beg)	500,000						
7	Sales on account	5,600,000						
8	Write-offs of accounts receivable	(20,000)						
9	Collections on account	(5,280,000)						
10	Accounts receivable balance (end)	800,000						
11								
12	Past experience ratio							
13								
14	Allowance for Uncollectible accounts (beg)	25,000						
15	Write-offs of accounts receivable	(20,000)						
16	Uncollectible accounts expense							
17	Allowance for Uncollectible accounts (end)							
18								
19								
20	Aging Method							
21				Current	0 - 30 Days Past Due	31 - 60 Days Past Due	61 - 90 Days Past Due	> 90 Days Past Due
22	Accounts receivable balance (beg)	500,000						
23	Sales on account	5,600,000						
24	Write-offs of accounts receivable	(20,000)						
25	Collections on account	(5,280,000)						
26	Accounts receivable balance (end)	800,000	=	600,000	100,000	50,000	30,000	20,000
27								
28	Past experience ratio			2.00%	3.50%	6.50%	13.00%	25.00%
29								
30	Allowance for Uncollectible accounts (beg)	25,000						
31	Write-offs of accounts receivable	(20,000)						
32	Uncollectible accounts expense							
33	Allowance for Uncollectible accounts (end)							

Figure 7.23

Beginning Your Allowance for Uncollectible Accounts Worksheet

- 4 Type **.50%** as the past experience ratio in cell B12.
- 5 Type **=B12*B7** in cell B16 to calculate uncollectible accounts expense as current period sales times the past experience ratio.

- 6 Type **=SUM(B14:B16)** in cell B17 to find the balance of allowance for uncollectible accounts.

“That was easy,” comments Nathan. “How do we use the Aging method?”
 “I’ll show you,” you answer.

To calculate the allowance using the aging method:

- 1 Continuing from your previous work, type **=(D26*D28)+(E26*E28)+(F26*F28)+(G26*G28)+(H26*H28)** into cell B33. (This adds up the past experience rate for each category of accounts receivable times the amount of accounts receivable in each category.) The result is the required ending balance in the allowance for uncollectible accounts.
- 2 Type **=B33-(B30+B31)** into cell B32 to determine the amount of uncollectible accounts expense necessary to give you the balance in the allowance you calculated above.
- 3 The completed worksheet should look like Figure 7.24.

Figure 7.24
 Completed Allowance for
 Uncollectible Accounts

	A	B	C	D	E	F	G	H
1	What SUP							
2	Allowance for Uncollectible Accounts							
3								
4	Percentage of Sales Method							
5								
6	Accounts receivable balance (beg)	500,000						
7	Sales on account	5,600,000						
8	Write-offs of accounts receivable	(20,000)						
9	Collections on account	(5,280,000)						
10	Accounts receivable balance (end)	800,000						
11								
12	Past experience ratio	0.50%						
13								
14	Allowance for Uncollectible accounts (beg)	25,000						
15	Write-offs of accounts receivable	(20,000)						
16	Uncollectible accounts expense	28,000						
17	Allowance for Uncollectible accounts (end)	33,000						
18								
19								
20	Aging Method							
21								
					0 - 30 Days	31 - 60 Days	61 - 90 Days	> 90 Days
					Current	Past Due	Past Due	Past Due
22	Accounts receivable balance (beg)	500,000						
23	Sales on account	5,600,000						
24	Write-offs of accounts receivable	(20,000)						
25	Collections on account	(5,280,000)						
26	Accounts receivable balance (end)	800,000	=	600,000	100,000	50,000	30,000	20,000
27								
28	Past experience ratio			2.00%	3.50%	6.50%	13.00%	25.00%
29								
30	Allowance for Uncollectible accounts (beg)	25,000						
31	Write-offs of accounts receivable	(20,000)						
32	Uncollectible accounts expense	22,650						
33	Allowance for Uncollectible accounts (end)	27,650						

You explain that the two methods are basically the same. The percent of sales method calculates the uncollectible accounts expense, which then dictates the ending allowance for the uncollectible accounts balance. On the other hand, the aging method calculates the ending allowance for the uncollectible accounts balance, which then dictates the uncollectible accounts expense.

“Sweet,” comments Nathan. “I’m assuming we can reuse these worksheets in future months?” he asks.

“Yes,” you respond. “Now that we have set them up we can just change the data and generate new results.”

End Note

In this chapter you have created worksheets to calculate present and future values, predict future costs based on past experience, and calculate an allowance for uncollectible accounts under both the percent of sales and aging methods.

Chapter 7 Questions

- 1 Identify the five variables in present value problems.
- 2 Describe the PV function in Excel and its arguments.
- 3 Describe the PMT function in Excel and its arguments.
- 4 Describe the FV function in Excel and its arguments.
- 5 Describe the Excel functions used in the Hi-Lo method of predicting costs.
- 6 Describe the Excel functions used in the Least Squares/Regression method of predicting costs.
- 7 Describe how to create a trend line for a chart.
- 8 Describe how Excel can be used to calculate an allowance for uncollectible accounts using the percent of sales method.
- 9 Describe how Excel can be used to calculate an allowance for uncollectible accounts using the aging method.
- 10 Compare the percent of sales and aging methods of determining uncollectible accounts expense and the ending allowance for the uncollectible accounts balance.

Chapter 7 Assignments

- 1 Create a new What SUP Present Value Analysis
 - a. Using the ch7-01 file to start your work, modify that worksheet to do the following:
 - i. Calculate the annuity payment required at the end of each year for the next 4 years such that the value in 4 years is \$75,000 and illustrate the annual value of that investment.
 - ii. Calculate the future value of an investment of \$23,000 invested for 4 years at a rate of 6 percent and illustrate the annual value of that investment.
 - iii. Calculate the future value of an investment of \$13,500 each year for 4 years at a rate of 5 percent and illustrate the annual value of that investment.
 - iv. Calculate the initial investment required to obtain a future value of \$16,500, assuming a rate of 7 percent for 4 years and illustrate the annual value of that investment.

- b. Save the file as ch7-01_student_name (replacing student_name with your name).
- c. Print the resulting worksheet in value view.
- d. Print the resulting worksheet in formula view. (Type **Ctrl ~** to switch views.)

2 Create a new What SUP Cost Analysis

- a. Using the ch7-02 file to start your work, create a worksheet to do the following:
 - i. Calculate the Hi-Lo Method variable cost/hour open and fixed cost.
 - ii. Predicted expense under the Hi-Lo Method assuming 500 open hours.
 - iii. Calculate the Least Squares/Regression Method variable cost/hour open and fixed cost.
 - iv. Predicted expense under the Least Squares/Regression Method assuming 500 open hours.
 - v. Display a chart of Expense/Hours Open with a trend line. (be sure to modify each axis so your scatter diagram is better displayed as you did in the chapter)
- b. Save the file as ch7-02_student_name (replacing student_name with your name).
- c. Print the resulting worksheet in Value view.
- d. Print the resulting worksheet in Formula view. (Type **Ctrl ~** to switch views.)

3 Create a new What SUP Allowance for Uncollectible Accounts Analysis

- a. Using the ch7-03 file to start your work, create a worksheet to do the following:
 - i. Calculate uncollectible accounts expense and the allowance for uncollectible accounts using the percent of sales method.
 - ii. Calculate uncollectible accounts expense and the allowance for uncollectible accounts using the aging method.
- b. Save the file as ch7-03_student_name (replacing student_name with your name).
- c. Print the resulting worksheet in Value view.
- d. Print the resulting worksheet in Formula view. (Type **Ctrl ~** to switch views.)

Chapter 7 Case Problem 1:

KELLY'S BOUTIQUE

Kelly's Boutique has several questions for you that Excel can help answer. Kelly is planning for the future and would like you to prepare a present value analysis. Using the file ch7-04 complete a present value analysis for the following situations. Save the file as ch7-04_student_name (replacing student_name with your name). Print both a Value view and Formula view of this completed worksheet. Kelly would like to know the following:

- a. How much she would have to pay at the end of each year, assuming a 4 percent rate of return, to yield \$150,000 at the end of 10 years.
- b. How much she would have at the end of 10 years if she invested \$75,000 today, earning 3 percent per year.
- c. How much she would have at the end of 10 years if she invested \$4,785 at the end of each year, earning 2 percent per year.
- d. How much she would have to invest today to have \$204,530 in 10 years, earning 4 percent per year.

Kelly has a very fluctuating workforce based on seasonal demand. She's ranged from having 10 employees in one month to 35 employees in another month. Some employees are paid a salary, others are paid hourly. She would like to know more about how these costs behave. Use the file ch7-05 to complete a cost prediction worksheet. Save the file as ch7-05_student_name (replacing student_name with your name). The worksheet should do the following:

- a. Calculate variable cost per employee, fixed costs, and a prediction of payroll cost with 20 employees using the Hi-Lo method.
- b. Calculate variable cost per employee, fixed costs, and a prediction of payroll cost with 20 employees using the Least Squares/Regression method.
- c. Display a chart of payroll/employees with a trend line. (Be sure to modify each axis so your scatter diagram is better displayed, as you did earlier in this chapter)

During a recent year Kelly's Boutique had sales on account of \$6,000,000, collections of \$5,800,000, write-offs of \$45,000, a beginning balance in accounts receivable of \$500,000, and a beginning balance in the allowance for uncollectible accounts of \$37,000. At year end, \$580,000 of accounts receivable were current, \$39,000 were 0–30 days past due, \$18,000 were 31–60 days past due, \$10,000 were 61–90 days past due, and \$8,000 were over 90 days past due. The company believes .7 percent of sales will not be collected. They also have experience that suggests that 4 percent of all current receivables, 8 percent of receivables 0–30 days past due, 20 percent of receivables 31–60 days past due, 25 percent of receivables 61–90 days past due, and 50 percent of receivables over 90 days past due will not be collected. Using the file ch7-06, complete the allowance for uncollectible accounts analysis for both standard methods. Save

the file as ch7-06_student_name (replacing student_name with your name). Print both a Value view and Formula view of this completed worksheet.

Chapter 7 Case Problem 2:

WINE DEPOT

The Wine Depot is planning for the future and would like you to prepare a present value analysis. Using the file ch7-07, complete a present value analysis for the following situations. Save the file as ch7-07_student_name (replacing student_name with your name). Print both a Value view and Formula view of this completed worksheet. The Wine Depot would like to know the following:

- a. How much they would have to pay at the end of each year, assuming a 4 percent rate of return, to yield \$86,421 at the end of 7 years.
- b. How much they would have at the end of 7 years if they invested \$8,000 today earning 4 percent per year.
- c. How much they would have at the end of 7 years if they invested \$550 at the end of each year earning 5 percent per year.
- d. How much they would have to invest today to have \$12,500 in 7 years, earning 2 percent per year.

The Wine Depot is trying to better understand the behavior of their selling expenses. They have accumulated selling expenses over the last 6 months and believe units sold are a good predictor of expense behavior. Selling expenses include commissions on sales and advertising. Use the file ch7-08 to complete a cost prediction worksheet. Save the file as ch7-08_student_name (replacing student_name with your name). The worksheet should do the following:

- a. Calculate variable cost per unit sold, fixed costs, and a prediction of selling expense when 10,000 units are sold using the Hi-Lo method.
- b. Calculate variable cost per unit sold, fixed costs, and a prediction of selling expense when 10,000 units are sold using the Least Squares/Regression method.
- c. Display a chart of selling expense/units sold with a trend line. (Be sure to modify each axis so your scatter diagram is better displayed as you did earlier in this chapter.)

During a recent year, the Wine Depot had sales on account of \$1,601,542, collections of \$1,523,541, write-offs of \$23,487, a beginning balance in accounts receivable of \$758,271, and a beginning balance in the allowance for uncollectible accounts of \$25,121. At year end, \$734,539 of accounts receivable were current, \$45,812 were 0–30 days past due, \$21,012 were 31–60 days past due, \$6,422 were 61–90 days past due, and \$5,000 were over 90 days past due. The company believes 1.6 percent of sales will not be collected. They also have experience that suggests that 4 percent of all current receivables, 10 percent of receivables 0–30 days past due, 15 percent of receivables 31–60 days past due, 22 percent of receivables 61–90 days past due, and 45 percent of receivables

over 90 days past due will not be collected. Using the file ch7-09, complete the allowance for uncollectible accounts analysis for both standard methods. Save the file as ch7-09_student_name (replacing student_name with your name). Print both a Value view and Formula view of this completed worksheet.

Chapter 7 Case Problem 3:

SNICK'S BOARD SHOP

Snick's Board Shop has several questions for you that Excel can help answer. The company is planning for the future and would like you to prepare a present value analysis. Using the file ch7-10, complete a present value analysis for the following situations. Save the file as ch7-10_student_name (replacing student_name with your name). Print both a Value view and Formula view of this completed worksheet. They would like to know the following:

- a. How much they would have to pay at the end of each year, assuming a 3 percent rate of return, to yield \$80,000 at the end of 5 years.
- b. How much they would have at the end of 5 years if they invested \$73,500 today, earning 3 percent per year.
- c. How much they would have at the end of 5 years if they invested \$1,850 at the end of each year, earning 3 percent per year.
- d. How much they would have to invest today to have \$25,100 in 5 years, earning 3 percent per year.

Snick's Board Shop is trying to better understand the behavior of their utility expenses. They have accumulated utility expenses over the last 9 months and believe hours open per month are a good predictor of expense behavior. Utility expenses include electricity, gas, and water. Use the file ch7-11 to complete a cost prediction worksheet. Save the file as ch7-11_student_name (replacing student_name with your name). The worksheet should do the following:

1. Using the Hi-Lo method, calculate variable cost per unit sold, fixed costs, and a prediction of utility expense when they are open 195 hours in a month.
2. Using the Least Squares/Regression method, calculate variable cost per unit sold, fixed costs, and a prediction of utility expense when they are open 195 hours in a month.
3. Display a chart of selling expense/units sold with a trend line. (Be sure to modify each axis so your scatter diagram is better displayed, as you did earlier in this chapter.)

During a recent year, Snick's Board Shop had sales on account of \$45,000, collections of \$45,500, write-offs of \$800, a beginning balance in accounts receivable of \$5,000, and a beginning balance in the allowance for uncollectible accounts of \$300. At year end \$2,400 of accounts receivable were current, \$700 were 0–30 days past due, \$300 were 31–60 days past due, \$200 were 61–90

days past due, and \$100 were over 90 days past due. The company believes 1.3 percent of sales will not be collected. They also have experience suggesting that 3 percent of all current receivables, 11 percent of receivables 0–30 days past due, 16 percent of receivables 31–60 days past due, 25 percent of receivables 61–90 days past due, and 50 percent of receivables over 90 days past due will not be collected. Using the file ch7-12, complete the allowance for uncollectible accounts analysis for both standard methods. Save the file as ch7-12_student_name (replacing student_name with your name). Print both a Value view and Formula view of this completed worksheet.

Chapter 7 Case Problem 4: ROSEY'S ROSES

Rosey's Roses has several questions for you that Excel can help answer. Use student file ch7-13 to solve 3 of these problems. This file has three worksheets labeled: Present and Future Values, Cost Prediction, and Allowance for Uncollectibles. Complete the file answering the questions below and then save the file as ch7-13_student_name (replacing student_name with your name). Print a Value view of each worksheet. (*Note:* This file has three worksheets.)

- a. Present and Future Values (Calculate the answer and then provide a table for each question. Use the first worksheet of the workbook to answer this problem.):
 1. How much they would have to pay at the end of each year, assuming a 6 percent rate of return, to yield \$15,000 at the end of 4 years.
 2. How much they would have at the end of 4 years if they invested \$1,000 at the end of each year, earning 5 percent per year.
 3. How much they would have to invest today to have \$15,000 in 4 years, earning 6 percent per year.
 4. How much they would have at the end of 4 years if they invested \$4,000 today, earning 5 percent per year.
- b. Rosey's Roses is trying to better understand the behavior of their delivery expenses. They have accumulated the delivery expenses over the last 24 months and believe that miles driven per month are a good predictor of expense behavior. Use the second worksheet of the workbook to answer this problem:
 1. Using the Hi-Lo method, calculate variable cost per mile, fixed costs, and a prediction of delivery expense when they travel 10,000 miles in a month.
 2. Using the Least Squares/Regression method, calculate variable cost per mile, fixed costs, and a prediction of delivery expense when they travel 10,000 miles in a month.

3. Display a chart of delivery expense and miles driven with a trend line. (Be sure to modify each axis so your scatter diagram is better displayed, as you did earlier in this chapter.)
- c. During a recent year, Rosey's Roses had sales on account of \$345,000, collections of \$337,000, write-offs of \$3,700, a beginning balance in accounts receivable of \$37,000, and a beginning balance in the allowance for uncollectible accounts of \$1,200. At year end, \$34,000 of accounts receivable were current, \$4,900 were 0–30 days past due, \$1,500 were 31–60 days past due, \$500 were 61–90 days past due, and \$400 were over 90 days past due. The company believes 1.3 percent of sales will not be collected. They also have experience suggesting that 3 percent of all current receivables, 10 percent of receivables 0–30 days past due, 15 percent of receivables 31–60 days past due, 20 percent of receivables 61–90 days past due, and 30 percent of receivables over 90 days past due will not be collected. Use the third worksheet of the workbook to answer this problem:
1. Complete an allowance for uncollectible accounts analysis using the percentage of sales method.
 2. Complete an allowance for uncollectible accounts analysis using the aging method.